



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,450	05/22/2006	Sadayoshi Horii	050169	4305

23850 7590 04/24/2007  
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP  
1725 K STREET, NW  
SUITE 1000  
WASHINGTON, DC 20006

EXAMINER
----------

DAHIMENE, MAHMOUD

ART UNIT	PAPER NUMBER
----------	--------------

1765

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/24/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/528,450

Applicant(s)

HORII ET AL.

Examiner

Mahmoud Dahimene

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/18/2005</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 3, 5, 7, 9, 11-17, 19, 20, are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuan (US 2002/0163028).

Regarding claims 1, 2, 3, 5, 7, 14-16, 19 Yuan discloses a method for semiconductor devices comprising loading an object (12) to deposit an oxide film (paragraph 0018) into a processing CVD chamber (figure 1), generating an activated gas by bubbling ozone in fluid containing at least hydrogen atoms (water) (paragraphs 0038 and 0041), supplying the generated gas into the processing chamber and

Art Unit: 1765

processing the object to be processed, wherein the processing temperature in the step for processing the object to be processed is in the range of room temperature to 200 °C and the temperature of the fluid containing hydrogen atoms is in the range of 80 to 120°C.

It is noted that Yuan does not expressly disclose the processing temperature in the step for processing the object to be processed is greater than the temperature of the fluid containing hydrogen atoms and unloading the object to be processed from the processing chamber after processing. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Yuan to select a process temperature higher than 120 °C because Yuan discloses processes in the range from room temperature to 200 °C, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One of ordinary skill in the art would have been motivated to use a process temperature higher than 120 °C when the deposition process requires such a temperature. One of ordinary skill in the art would have been motivated to unload the object to be processed from the processing chamber after processing in order to use the object outside the processing chamber.

As to claim 9, Yuan's range of room temperature to 200 °C overlaps applicant's claimed range of 100-500 °C. Overlapping ranges are held obvious.

As to claims 12, 13, hydroxyl radicals must be generated in Yuan method as well since ozone is bubbled in a hydrogen containing liquid in the same manner as applicant's claimed process.

As to claim 17, Yuan discloses hydrogen peroxide is conventionally used for CVD oxide (page 1, paragraph 0007).

As to claim 20, Yuan suggests the chamber in figure 1 includes all the limitation of applicant's claim 20.

***Claim Rejections - 35 USC § 103***

4. Claims 4, 5, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kenji et al. (JP 04263086).

5. the reference of Kenji discloses an etching method comprising the steps of: loading an object to be processed into a processing chamber, generating an activated gas by bubbling ozone in fluid containing HF, supplying the generated gas into the processing chamber and etching a film formed on the object to be processed (abstract).

6. It is noted that Kenji is silent about the etched film being an oxide and unloading the object to be processed from the processing chamber after processing, however, it would have been obvious to one of ordinary skill in the art at the time the invention was made to expect the HF to etch at least the native silicon oxide because HF is conventionally used for etching silicon oxide, and unloading the wafer after processing is a routine procedure.

***Claim Rejections - 35 USC § 103***

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kenny et al. (US 2002/0157686).

Kenny discloses "In a system for cleaning a workpiece or wafer, a boundary layer of heated liquid is formed on the workpiece surface. Ozone is provided around the workpiece. The ozone diffuses through the boundary layer and chemically reacts with contaminants on the workpiece surface. Preferably, the liquid includes water, and may also include a chemical" (abstract). FIG. 1 is a schematic block diagram of an apparatus for cleaning or processing a workpiece, such as a semiconductor wafer, with ozone injected or bubbled into the liquid (page 2, paragraph 0021).

It is noted that Kenny does not expressly recite the steps of: loading an object to be processed into a processing chamber, processing the object to be processed in the processing chamber, unloading the object to be processed from the processing chamber after processing, generating an activated gas by bubbling ozone in fluid containing at least hydrogen atoms, supplying the generated gas into the processing chamber with the object to be processed unloaded to remove contamination substance in the processing chamber. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kenny to process any workpiece including the contaminant substance in the processing chamber because Kenny suggests any surface can be cleaned citing "The apparatus and methods described here may be used to clean or process workpieces such as semiconductor wafers, as well as other workpieces such as flat panel displays, hard disk media, CD glass, memory media, etc." (paragraph 0035). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Kenny to include cleaning contamination substance in the processing chamber when

Art Unit: 1765

the wafer in unloaded to clean at least the wafer support. One of ordinary skill in the art would have been motivated to clean the wafer support in order to remove contaminants carried into the chamber through the wafers backside.

***Claim Rejections - 35 USC § 103***

8. Claims 8, 10, are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuan (US 20020163028) as applied to claims 1 above, and further in view of Hwang et al. (US 6,423,648).

It is noted Yuan is silent about the surface of the object to be processed is etched.

Hwang teaches a gate oxide is formed by combining an oxidizing agent (e.g., N.sub.2 O, CO.sub.2) with an etching agent (e.g., H.sub.2) and adjusting the partial pressures to controllably grow a thin (.about.12 Angstroms) high quality oxide (14) (abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Yuan to form oxide and etch at the same time because Hwang teaches a gate oxide is formed by combining an oxidizing agent with an etching agent (e.g., H.sub.2). One of ordinary skill in the art would have been motivated to use ozone as an oxidizing agent with hydrogen from the water in order to form an ultra-thin gate oxide which is desirable for fabrication of highly integrated MOSFET transistors as suggested by Hwang.

As to claim 10, Yuan range of room temperature to 200 °C overlaps applicant's claimed range of 50-400 °C. Overlapping ranges are held obvious.

***Claim Rejections - 35 USC § 103***

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yuan (US 20020163028) as applied to claims 1 above, and further in view of Jiang et al. (2003/0087507).

It is noted Yuan is silent about HCl

Jiang discloses "Example reaction conditions for depositing silicon dioxide from silane or halogenated silicon include contacting the semiconductor die with the silane or halogenated silicon in an environment that includes O.sub.2, N.sub.2O or CO.sub.2 at a temperature of about 200.degree. C. to about 600.degree. C. for a time sufficient to deposit a silicon dioxide layer of at least 10 angstroms thick. Typical silicon halides include SiCl.sub.2, SiCl.sub.4, SiBr.sub.2 and SiBr.sub.4. In certain embodiments using silicon halides, an acid such as HCL or HBr may be added to facilitate the oxidation reactions which result in the production of silicon dioxide (page 2, paragraph 0028).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Yuan by adding HCl because Jiang teaches such a additive. One of ordinary skill in the art would have been motivated to add HCl in order to facilitate the oxidation reaction as suggested by Jiang.




Art Unit: 1765

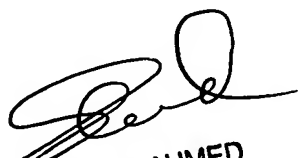
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahmoud Dahimene whose telephone number is (571) 272-2410. The examiner can normally be reached on week days from 8:00 AM. to 5:00 PM..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



MD.



SHAMIM AHMED  
PRIMARY EXAMINER